



**IMPACT OF TECHNOLOGICAL DEVELOPMENTS ON
MANAGEMENT IN INDUSTRY**

Mr. Gerhard Neumann

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Reviewed by Col E. J. Ingmire, USA on 4 February 1964.

**INDUSTRIAL COLLEGE OF THE ARMED FORCES
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22 January 1964

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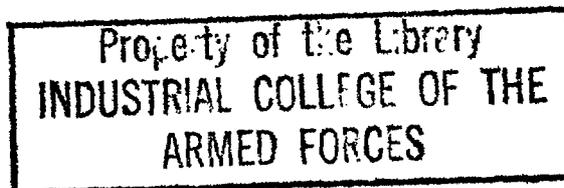
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COLONEL INGMIRE: Gentlemen: Up to now you have heard a little bit about management theory. You have heard a lot about the functional areas of management as they are practiced in various industries in the United States.

This morning we've got a man here to tell you what a manager does. Sometimes it is not related to theory and sometimes it is not related to functional areas of management. I think his general evaluation is that if it pays off that is what he is going to do.

To talk to you about this subject, we have with us Mr. Gerhard Neumann, Vice President and General Manager of the Flight Propulsion Division of General Electric Company.

This is Mr. Neumann's fourth visit to the Industrial College. This is the only speaking engagement that he will take in the United States.

Mr. Neumann.

MR. NEUMANN: Good morning. Gentlemen: As he said, I am here the fourth time, and I'm glad to be here. I believe that so far as short- and long-range investment is concerned, my time invested to talk to you is invested better than any other way.

You are the people who already are or will be the decision-makers, every one of you, or you wouldn't be here. I have already met some of the graduates here, 3 or 4 years ago, who have made some very important

decisions. I am very glad to have met them. They are good personal contacts. I want to say I am very, very happy to talk to you.

I am not going to talk about theory. I am not going to talk about exactly the title I am supposed to talk about. I read your recommended literature. This time it is about the mixup in organization at General Electric. This is partially true, but after I read it I found out that the guy who wrote it was like a Popular Mechanics Magazine writer. This isn't really what is so. The other one about long-range planning and cloudy horizons is true. It's pretty goddam difficult to plan anything with these cloudy horizons.

I will not talk about it, because it's just a matter of good luck, anyhow, in many respects. You have to plan. You couldn't live without it, but how true these plans are, as we discussed just now when we were having coffee, you don't know from day to day.

So let me go right ahead. I have exactly 40 minutes. Let me tell you what I am trying to get across to you. I am supposed to talk about "The Impact of Technological Developments on Management in Industry." This itself is a brief talk about too much. We won't do this here now. That takes week after week.

I have nothing basically new. Everything I am going to tell you you really know. You may not apply it but you have heard it and you know it intuitively, instinctively. So, why am I here? I am here because I have been invited and I accepted. Secondly, I am here because I told you that you are the men I like to meet. I want you to have a

chance to meet someone from General Electric. I have been with the company 15 years as a part of General Electric. It's a good outfit.

But the main thing is to give you a lot of difference while reading the words on an organization centralized or decentralized, and communication, and measurement. What does this really mean as far as one individual happens to have it as his concern?

Lesson One. I agree with my host here. I'll leave three or four messages with you. You couldn't absorb more, anyhow. One message is that it is all relative to yourself, and it's complicated. I was asked to give the same talk I gave last year but to update it. This is the updating part of my talk.

I learned that, if I am a manager, or if you are a commander, we will have ultimately, maybe in the matter of a year, a staff reporting to us in whom we have confidence and whom we like. These men will reflect what we think. A very good man who works for you successfully may not work successfully for someone else who is of different caliber. I am fast, aggressive, unreasonable, according to my associates, impatient. I have a sense of humor, and certain good things and certain bad things. Pretty soon you will get yourself a group together the same way, or very similarly. You work as a team and things go fine.

So whatever recipe I give you applies just to my own personality and the staff I have and the staff you will have for yourself. Some guy may just fool around and not produce at all for you, because he is of a different caliber, maybe a long-hair. He thinks, "Don't let's

go so fast." I've got all military personnel. I'll tell you the truth. Everyone reporting to me is an ex-military man. I just like it this way. I like them to be aviators if possible, because they have learned that there is just so much gas in the tank and they've got to put the wheels down and look for a landing field somewhere. In other words, they make decisions.

I'll try to give you in the very short time I have some of these things. I am told that you want to hear something about delegation of responsibility and authority, something about centralized management, something about measurement and communications, something about short- and long-range planning. I'll try to do this in 30 minutes.

I'd like to do something while I am here, because this came up in the question-and-answer period, which both of us cherish and like, in the last two sessions. I was asked about, and I want to plug for, better incentive for good performance, better understanding of a contractor's risk, which is part of the reward. The elimination of political decisions will be impossible, but let's discuss it briefly. I have marked here ^{and} VAL / TFX, for the Army, and for all the three services, as a puzzle, and fuller understanding of the Government's advantage in industry's commercial sales. This is being kicked around in the newspapers already and in Congress, in Congressional hearings. I'll talk about it if we have time. If we haven't got time I won't touch on it.

This you see in all the textbooks: What does it take to get

these projects done? We need objectives, requirements, and definitions. There is no problem. Every^{one}/does this. They may be right or wrong, but they are objectives. The checkmarks mean that I am going to talk about these particular items. I will not talk about objectives, although this itself is an interesting subject--what is the objective and how well you define it. You can define it so tight that it is impossible to meet, or you can make it loose and it's no good. Objectives. O.K. You know that.

Then you have to set up an organization. We'll talk about responsibility, decentralization, and so on. Then you have to design and develop--fascinating. I could talk about this for months, but we won't discuss this today.

Measurements are really important. What is really going on, not what are you going to be told. What does PERT say? What does PAR say? We are full of alphabetical assistance. Really, what is a standard? Can you ever find it? It is dangerous to think that you know when you don't know. This happens. It happened to me last month. It really can happen. It's a very important program.

Communications are equally important. I have rapport with you, I can tell, now. Some people have not. I have not rapport with my upper levels at times, and I'm in trouble. When I have good rapport we get along fine. Decisions are made as a consequence of what I have here, measurements. You can also reverse them. Maybe you make a decision and then communicate.

Then there is good luck. I am a firm believer in good luck. I am not really superstitious but it doesn't hurt to knock wood three times. You know that. I never heard anybody do this.

Organization--you have read a lot about General Electric's decentralization. Indeed, since 1952, the General Electric Company, which was a fully centralized, \$2.2 billion annual sales company, has decentralized, and this year's sales are \$5 billion. So we over-doubled in 10 years. I understand that a good share of this is due to the fact that we decentralized. I personally do believe this completely. There has to be decentralization up to a certain point. I am always kidded by my associates, who say, "You like decentralization, up to you." This is true. I like it up to me. Then I like to centralize it under me. The problem is that one of these days I'll either get fired or run over by a truck, or quit, or something, and the next guy may feel different.

But, seriously, I believe now and my experience has shown that you have to decentralize the different businesses. Let's take General Electric. I am familiar with it. Obviously, the toasters and cooking stoves and refrigerators have very little to do with jet engines. So take this business and decentralize it, and get it away. The same with electronics, nuclear, and other things. They should be decentralized under their own management, tied in by company corporate structure, so that the investments of funds are fairly distributed. Some plans have to be reviewed.

But then, within a business there are related segments. Let's

take my business--flight propulsion, jet engines, for transports, for commercial, and for the military. This is one business and I run it pretty well, centralized, pretty well.

Now, I have a big plant in Cincinnati, Ohio, and a big one in Lee, Massachusetts. There are 20,000 people in these plants--3,000 engineers. There is a large engine and a small engine, and an advanced engine and a commercial engine, located in these places. There has to be, obviously, since we have one customer, mainly, which is you, the Government, one, common, contract form. We don't want to duplicate research and development. Because one is in Massachusetts and one is in Ohio, you wouldn't duplicate this, either, but we did duplicate it. So I recentralized this kind of overall control into myself, with a small staff, so that we can centrally control this operation.

But within one department--let's take the large jet engine department or the small one--we have the following setup: We have a Project A, with a manager, a Project B, and more projects, C,D,E, and so on. The Project Manager is, in our opinion, an extension of the General Manager. In other words, if he has only one project, this will be the general manager. If he has more he can't possibly do all the measuring and walking the shop. So we have a Project Manager, A, B, and C.

This Project Manager has program control. He has a couple watch dogs in various fields--mechanical and manufacturing. He has the responsibility to see that the program runs. Application means where else can he sell his program. The program is under this man.

Then there are engineering, manufacturing, quality control, and so on, such as finance, legal, and employee relations. There just are not enough good, really good and outstanding engineers around. They are around, but they are distributed. You don't have that many really good people. So we kept the really good people together. Together they are strong. There is one engineering group, one manufacturing group, and one quality-control group.

These project managers have to get from them the support they need. This is in conflict with some of the desires of the Government. They like to see a missile program fully staffed with everything and having full authority. This is fine if you can afford, and if, again, the program doesn't get cancelled. You know, Skybolt, Dinosaur, and some missiles, MRBM's, were cancelled. There are so many other things which can be cancelled, so that, all of a sudden, you sit there with the whole thing cancelled, all the experts disorganized, and a lot of messy things.

We found this system to be the best, the project manager system. I believe this from experience, and I have tried them all, one system over the other system. He must have authority. If he doesn't get service from these guys, he runs right up to the General Manager, who says, "Look. You had better give this guy some help." There is a project manager for A, for B, and for C. He has key people, only 15 or 20, a small group. There's nothing about Parkinson's law. There is tight control so that this thing doesn't build up to become a monstrous organization.

They he buys these expert services from the functional group.

Now to measurements. Obviously, you will get progress reports. The military demands it and the Government wants it. We want it, too. Then we have a report system of PAR. This is Progress Analysis Report. That's something we started. It's an improvement over PERT. I recommend it highly to you when you get back to your service. Look into PAR. Ask someone to get a copy from General Electric--not because it's GE, but I think it's very good. That system has just a few, simple charts which an executive like you or I can look through in 15 minutes. It's mainly on charts--what you've spent versus what you thought it ought to be, technical progress, and so on.

Then it has, in one page: What does the customer think? That's a very important thing. Then you find out that your own people don't write down what the customer really thinks. First, they may not know, because many customers are polite--like you, or the airlines, in our case. This is what the customer really does think. Then the next page is: What difficulties do they have? You know this already. Usually one says right what the difficulties are, and therefore there is appropriate, corrective action. Then, what difficulties are you anticipating? Again, you as a top man, reviewing this, depend on the honesty and on the smartness of the anticipatory capacity of the individual writer. If some guy is stupid and dense, he cannot anticipate any problem. The wheel may come off your car next time, and he wouldn't know this. He's rattling around. If he has a flat tire, he just doesn't see it, and he goes ahead. Those guys you ought to get rid of, really fast. But there

are guys who can, and when they are good people that you pick, they will write down what they believe the next major problems are going to be.

Once you define a problem, as I am sure you have been told here by many people, half the solution is there, by just defining the problem. When Clausewitz, my old German friend down there, had a problem recognized, it was half solved. There is no danger then. Once you have a danger recognized, there is no danger. You can take evasive, appropriate, corrective action in most cases. If nothing can be done you go to the military, the Government, and tell someone, "Sir, I screwed up the works. Here is the problem. I need your help." My experience has been that with the Army, the Air Force, the Navy, and anybody else, if you will go right up and face up to it and tell him, "Look, here is my problem. I fouled it up, or it turned out to be different than anticipated, and it will cost an overrun. It will be heavier. It won't quite do. It will take longer," he will understand, because all of us have made mistakes before. They like to be briefed right away.

The best advice I can give you is to say, "I would like to make the following recommendation. I need your help in extending the program, or giving me more money, or doing this, or doing that." Don't just go in and say, "I have a problem." They'll say, "Well, that's too bad. What are you going to do about it?" He'll send you away and ask you to come back tomorrow with a list of what you want to do about it. Go right in and say, "Here is my problem and this is what I think we have to do about it." Think about it and do it, and you will find that it will be

all right.

That's the PAR report. The PAR report appraises the customer climate. It also lists who saw whom. Not, "We saw the Air Force and the Navy." Whom did you see in the Navy. That's always important. And not, "I saw a Rear Admiral or I saw a Captain, or a Commander." He is this guy and he is responsible for that is what you say, so that the reader, like myself, knows, that this son of a gun is nasty and he doesn't like General Electric because he had a bad toaster or his electric blanket went off at night. He'll be all anti-GE the next time. That's our risk.

I just heard yesterday that President Johnson had a problem with an electric blanket. We had a call. I'll tell you, we didn't send anyone to repair it. He got a new electric blanket. This was last week.

Then there is customer feedback. I referred to it. The measurement of customer feedback we don't do enough of. We don't have enough time. I have to go back to Washington more than I am doing. Every time I come I talk with you fellows or the civilians in the Government, or the top people, and I am glad I came. I find out something else. I find out something about my own operation, or I find out that this particular individual is misinformed. I have then the opportunity to say, "Well, General, just one minute. The figure you got of engine failures is of engine failures, but not engine cost failures." In other words, somebody left a wrench in the engine, or rivets drop off, or there was a dirty runway, or something else. He says, "Oh, I didn't know that." He calls

his aide in and says, "Check this back." I say, "Will you please check right now, while I am here?" He does. He calls back and says that is right. So the general says, "I am sure glad you came." I know when I go out that he feels different.

The measurement is to get the customer feel, or the customer feedback. Either it is correct or you can look through your bailiwick and do something about it.

I tell you, gentlemen, I have a nice crew working for me. I rely on them. Hell, I couldn't do without them. I wouldn't want to be without them. But you must personally go back to see your customer and say, "Customer, what do you feel toward my product?" Either he knew about your coming and has been briefed, which is the case with the military-- he has a little sheet there and says, "O.K. This is fine, and so and so"--or he will say, "I am not prepared." This is just as good measurement. I say, "General, don't think now. Just say what is on top of your mind. Have you heard anything about my engine?" He says, "No." That's enough for me. If something had been really bad he would have been tipped off already and briefed. Boy--another clash, another accident, maintenance is too expensive, and so on.

This is customer feedback, a very important thing. It applies to you in the Government just as well, because some other branch is your customer. For your supply, your materiel, or your development and research planning, you are a customer, just like I am.

In general, rumor is a good thing. Go to the toilet often and you

will hear all kinds of things. I am not exaggerating. You get it there. You see people coming down and looking underneath to see if anyone is there. I do it. You see another guy in there and you take a quick look to see who's there. If you see a bunch of legs sticking out, you have to be careful. You'll hear rumors.

I told you, I got very disappointed about one of my own major departments in my organization. I heard the rumor and I didn't believe it. It turned out to be right. So, not all rumors are true, but, where there is smoke there is fire. So be sure to follow through rumors. One of your trusted aides will say, "Listen, I heard something down there. Don't reveal this." I used to run it very honestly. I'd call a general manager in and say, "Mr. So and So, I heard the following rumor." He say, "Who? Me? Impossible. Who told you?" I used to tell him, and I found out that you should not tell him. Although I like to play it honest, I found that you wipe out the source of information. While it's nice to tell whom you are talking with, "Well, I heard it from this guy," then the guy who told you maybe is in trouble. You tell **this to the one** you are talking to, and he says, "Nothing will happen to the man." As a matter of fact, I'd tell him, "Now, look. I'll tell you who it is, but, by God, if I hear that this guy gets transferred or something else, I am going to get rid of you or somebody else down there who does it." He won't be transferred, but he won't be promoted, he will lose his confidence, and so on.

So, that's an awful thing to say, but you don't reveal the source. At least, I don't any more reveal who tells me. I say, "That's for you

to find out if you want to find out. First, tell me if it is true or not." Since they don't know who it is they begin to look and find out more, usually in this one area, so you find out your problem.

Audits are next. We hate auditors, but still, the financial community, those of you who are in finance know, never works without an auditor. The GAO is an auditor. Some findings are silly, some are just. It seems that they've got to find something. Sometimes you don't have to feel bad at all. In a big organization you always find things. Not that you should, but you can't help it. If there are people in it, you'll find something.

Still, you've got to make it clear to your people, like I do to my people, when I hire them--I offer them the job with the title, the salary, and so on, and a fine office with a goodlooking secretary--I say, "I am going to operate with auditors, so don't you say you don't like it later. It's part of the job you get into. I will audit at any time and I'll send in auditors, not for just finance and expense accounts, but technical auditors, manufacturing auditors, efficiency auditors, and I'll audit all along the line."

The Government is doing it and they are right. They're finding all kinds of things, some embarrassing, some of which we didn't know ourselves or don't know. That's auditing.

Then there's my old thing--walking the shop. There's no better thing. President Johnson, I think, said the other day, "The footprint of the master in the shop is the best damn fertilizer." You go around in the

morning, you go around in the evening, and you go around at night. Don't say ahead of time that you are coming. I used to tell them, "Look. I'll come Tuesday afternoon at 3:00. I'd like to visit your shop." Boy, everything is polished. The work goes on just fine. Everybody is wide awake and has his playing cards put away, his bottles, and everything else. Don't tell them. Just show up and keep the people on their toes. Walk the shop.

If you do all these things you don't have any time to do anything else. This is exactly it. I'm spending time talking here. But I think this is worth-while for you and it's worth-while for me.

You've got to have reports, you've got to read them, you've got to talk with the customer, listen to rumors, and get auditors in, and get yourself some real, good ones. Get some really good auditors in, a few, but honest. They can just smell the climate. I don't know much about manufacturing, but when I get a good manufacturing auditor he just walks through the shop. These guys find things. There are foremen, and you can send a special team down there/and work the problem out with the department manager.

And walk the shop yourself. This you can't delegate. You've got to do it yourself.

Well, the next chart is delegation. You are the one who wants to know what is going on because you are responsible for it. Now, you give instructions on what you want. You are going to get a feedback. You talk to the customer and you find out what he wants. We forget the up business every so often. You communicate up. Early, get your reports

up and keep them brief. They don't want to read long reports. If you have a long report they'll take it, but you can be damn sure that no one will read it if he is busy. If you send a long report they'll throw it in a corner, and you have not done your job. You cannot go later and say, "Sir, I sent you a report and here's a copy of the letter. This is the date I sent it to you." It doesn't do anything. If anyone does this to me I throw him right out.

Your report must be brief, concise. You write down there, "Please don't worry. I'm on top of it." Or you write, "Watch it. You are going to get a call from President So and So or General So and So," or whatever it is, and what you plan to do about it. Make it very brief. Anything more than half a page just won't do. If you have a busy top guy in the Government, an officer in the military, he wants it brief from you and it's difficult. You've got to do it.

Communicate down and up, not just down. Find out what he really thinks about it. Get the report up and have it clear and brief. It's difficult. I write now a weekly report to my boss covering all the programs, and I demand a report daily from my people. I do a good job on the weekly. I have a system if something special happens. Mr. Parker is my boss. He's a Group Executive in General Electric for the whole area of Aerospace. I say to him, "If anything happens, don't worry. I'll let your secretary know." Sure enough, if a major crash occurs, a helicopter goes down, or something happens, I get the word to him. When I was down in South America I got the word to him very fast, provided I got

it fast. You get it fast. It is your judgment what should be passed on and when.

I am sorry to go through these so fast. I could talk about each of these items at great length. I hope to give you two or three points which I want to get to you, and I want to make them clear.

I've said this before. Even if you delegate a thing--and you must delegate it, you can't do things all by yourself--you are responsible. It took many years to get this through. Goddam it, if things don't go up, I get fired, not the other guy. And I should get fired. I get promoted when things go well.

It is you, as a responsible individual, who are charged with it. You know darn well that if you just ring the bell and your man comes in and you say, "Now, you handle this," when he goes back to his office he has a smaller bell, and he rings the bell and someone else comes in, and he says, "Now, you handle this," and this guy goes back and he has no bell, so he has to yell to get somebody in there. It goes away down to the lowest level. Your organization will reflect you and the way you work. What the paper says means you and the way you work. Pretty soon your organization wants it the way you do.

You say, "All right. You do this. But I want you to report back and I'll tell you. I'll go down in your shop and I'll watch it. If I ever find some difference either you are dishonest or you are incapable, so you can go." You'll be called an S.O.B. You'll be called a slave-driver. You'll be called anything. But they'll respect you, and you'll

get a better product, and in the long range they will all benefit from it. The Government has confidence in you because you tell them the truth and you produce the goods. What else does the Government want? They don't care what the internal problem is. Those problems disappear. Those who don't like the way you operate quit anyhow. Pretty soon you are going to have an alert outfit down there which runs like you, and everything will go very well.

Our division right now at General Electric is the largest division in the company. We are making 2,500 jet engines this year. We make more engines now than we ever made, including the Korean War. It is not all due to me, I am sure, but we had good luck and I have a good staff working there. We've got a team together and we are working with the Air Force and with the Navy. We haven't succeeded much with the Army but we are slowly getting to the Army now on the Caribou Program, and the VSTAL Program, and so on. This is because we are honest and give the Government what it wants in most cases. Sometimes we fail.

Now, delegate, but don't abdicate. You and I take the risks. So you've got to make a decision. A decision is due. What should you do? Well, you've got to make a decision. Wheels come down when the fuel runs out. It's easy to make a decision. You get more data and more data and analyze it. It's usually easy, I would say. The longer you wait the more things get clear, but maybe it's too late and the train has left by that time. It's a gamble. You have intuition. You look at your plans. You list all people. But you make a decision

even if it's completely counter to the rest of the group. Don't you waver. If you believe a certain thing you just do it this way. If you are wrong, you ought to get out of it, anyhow. If you are right, you carry on. Gentlemen, many, many decisions get swayed by other people.

I subscribed to the American Scientific Magazine when I understood it. Now it gets into electronics and nuclear information and I don't read it any more. I can't follow it. But years ago it was simple. They had a college course. I think there were about 20 students in it. They were all tipped off, but one guy wasn't tipped off. They had a short bar and a longer bar, and they asked, "Which bar is longer?" This particular guy who wasn't tipped off was at the end of the line. They asked the first guy and he gave the wrong answer. The next guy gave the wrong answer. The next guy gave the wrong answer. They purposely agreed to this. Finally it came to the end man, and he said, honestly, "No, I think the other way." Then came another problem and another problem. Pretty soon the guy found himself out of step, and he changed his answer. It was proven that the guy just lost confidence in himself and gave the wrong answer because everybody else did.

two

Then they put/of these guys together who weren't tipped off. Once there were two--this is interesting--they stuck to their guns. I think it is a very interesting example. It may not apply in all your cases. But, don't give up. You are responsible. If you think your way is better, do it in a nice way and in a polite way. Don't tell your boss he is wrong. I don't want anyone to tell me I am wrong. I hate it. I

don't like to be wrong. If someone comes to me and says, "Mr. Neumann, I looked at this and I just don't quite see it the way you do it or the way you understand it. Will you please explain it to me again, please?" the guy has a point. Then he can come back the next morning and say, "I've thought about it, sir, and I think we ought to do it the other way." I think the guy gets me over if he's right and if he convinces me. But just don't tell a guy he is wrong. Most people hate to be told they are wrong.

Well, maybe you don't see this. I used to do it. I didn't snuff out my career, but I had many bad moments.

This is my last chart, and then I'll go back to what I want you to know. You and I must have an intense personal interest in what we are doing, or you and I must show an intense personal interest. The best is, you and I must have and show an intense personal interest.

This, gentlemen, is the main message, if I get nothing else across. If you show your people that you are interested in certain things you will see that you will get action. Many things may not go, but when you as a boss say, "I am interested in clean reports," you'll get them, and If you say, "I'm interested in cost reduction," / you mean it and you show it, by walking the shop and by calling a group together and saying, "How much did this part cost? Why did it cost so much? Why didn't you ask Outfit X about it, and get another price quoted?", and if you show interest, it doesn't take long, gentlemen, to get the interest through the organization. They'll say, "The old man wants this, and this."

If you show interest, I'll bet you get goodlooking secretaries. They may not be able to type, but, goddam it, you get goodlooking women. I know it. I'm interested in them. I got them. They couldn't type, but now I have one that is goodlooking and can type.

Please forget everything else I say, if you want to, but you must have and show a personal interest. You can't have interest in everything. Maybe you have special interest in what you want. It may not be always the same. Say today the word is cost reduction. For half a year push cost reduction. Then, when you put your interest on something else, cost reduction slowly will taper off again, and then you have to come back again a year later and hit it again. You are interested in manpower reduction and cost reduction. You are interested in cleanliness, in zero defects. We have a big program on that. I showed interest last year in zero defects. I want no defects in our products going out. Quality can slip.

We had a big meeting in the Boston Garden, with 7,000 workers. The Governor of Massachusetts was there, and the presidents of the unions, my general managers, and myself. We had movies of the Air Force, Navy, and Army officers talking about it, and the FAA. We had a big rally of all shifts, saying "We want zero defects." Big charts were posted on each station reading, "How many mistakes on this station?" really big ones, not little ones, visible to all.

Gentlemen, our quality has got to be embarrassingly good. On our quality products mistakes are down and the cost is down. You can't keep

this up forever. In the meantime something will happen again. They hired more people to do this, and they have more inspectors. So now in a half-year we'll tell them to be cutting people. By that time the quality will suffer a bit, and you go back again.

But, if you show the interest, and you mean it, gentlemen, you are going to get things done. There is no question about it. If McNamara wants certain things done and he shows interest they get done. I'm sure of it. I hope you will remember this in my talk.

Now back to what I was going to tell you, very briefly--better incentive for good performance. Maybe you can take this up in the question period. I was asked the last time here, "Mr. Neumann, do we have an answer on how to reward you better?" All I want to say at this point is: The word is across, and McNamara/^{and} the Department of Defense have publicly pronounced, "We want to give those contractors who show good performance a better incentive." However--this is my message here--the word spoken is not the word executed on the lower level. This is a very disappointing thing, because we really struggle--the workers, the managers, and the engineers--in our case for sure, to do a better job for the Government, cheaper and so on, and we don't get better incentive.

As a matter of fact, I'll tell you this. We make an engine for \$200,000. In production it has been maybe \$250,000, \$220,000, and finally it's down to \$200,000 after a few years. You know, it's difficult to get the cost down once you reach a certain learning curve. Now, finally, we said, "Let's try to get that cost down to \$150,000. These figures are

accurate. But the contract negotiator gives you a certain profit rate on the expected cost. So, 10 percent on \$200,000 is our profit. He says, "I understand you are laying off people, you are streamlining, you are cutting out new materials. So if the price is \$150,000 you'll get 10 percent on \$150,000. That's as true as I am standing here. My sales are out 25 percent. On engine shipments the profit is down. The unit cost is so much further down, and we did a real break-through on an item in production, and the profit is down, which is totally unfair. It is not intended, but this is a fact of life.

If I don't sign a contract, we run on months and months and months and months without a contract. The company is the banker for the Government, and then they renegotiate, and so on.

So I would like you to remember that/^{what}you hear or what you say is not necessarily what the civilian officer says who is there to contract negotiate and whose job it is to do this at as low a cost as possible and who does not recognize that the incentive should be there for good work so that we do even better. It's unfair. I'll tell you frankly, this is a great disappointment after what is being said on top by McNamara, and which is not going to be done in life.

Then I must tell you about risk. You say, "Well, hell, we are buying all the facilities." We have a lot of risk even if the Government buys all facilities, which is not so. You buy certain tools and certain things, and certain hardware, and your facilities, your reputation, the hiring of people and the laying off of people are very important assets

in the company. If we don't do a good job or do a good job, and get the business or don't get the business, or get a cancellation or don't get a cancellation, we have a lot of risks, a lot of reputation, a lot of financial investment that we are risking to an advance release on improvement necessary, gentlemen. On an engine which is now flying, which shows some deficiencies, if I would wait for the contract from the Government to make new parts and better parts, and order them in quantities to replace all the bases, you would be cracking up and you would have a lot of problems. So we take the risk in the interest of our product, in the interest of the pilot and the crew flying the plane, and in the interest of the United States, to advance release designs and to go ahead without a contract and order the project.

This takes hundreds of thousands and often millions of dollars. I am not exaggerating. In my division alone, when we advance release, and when I say we must get this out, they must have new blades, they must have new rotors and new controls, or new something, and we are at risk, because every so often someone in the Government will say, "No, we don't want it," and you sit there with an inventory of \$1 million or \$800,000. They say, "We don't want it," and there you sit. You can't sell it, and you can't do a damn thing with it.

So, if I were to be negative and say, "O.K., sir, from now on we just won't do it any more," I don't think we'd be good Americans. There is a lot of risk involved in what the contractor has to do to do a good job. I hope you remember this, if you read it or hear it talked about, and you

hear someone say, "Those guys have no risk; we are paying for everything." This is not so. Many, many times we advance release, advance work, and do things because either the red tape doesn't go through or because you need more evidence that this thing will be paid off after 2,000 hours. Hell, 2,000 hours is 5 years in military flying. You fly only 50 hours a month if you fly a lot, and usually it's only 30 hours a month.

So we know from experiments that, if a certain thing doesn't go right, or from a record happening here and there in pattern development, we had better make a change. We don't wait for you to go. We release this and tool up work and invest here and there. So we have quite a bit of risk.

Elimination of political decisions is very difficult. I mentioned VAL, and TFX for the Army. VAL is a Navy program. They said, "We need a new airplane, and it's going to have Brand X engines--PERT." It happens to be not my engine, and that's why I'm mad at it, naturally. There are times when it is specified that Brand X engine will be bought for an airplane. Everything will be competitive but this engine will be specified. That doesn't make any sense. It is not only not fair but it doesn't make any sense.

The TFX I talked about last year. You all know about it--Boeing versus Convair--a real mess. You know there were six people in the race who make airplanes. Four of them picked the General Electric engine, including Boeing, the fifth one changed to General Electric, and only one picked Pratt and Whitney, and the decision was made right away, before

anything was decided, to use one engine and not another engine. This was, in my opinion, a nontechnical, nonjustified decision. I am not complaining about it. The Congressional hearings were a mess, anyhow.

This is sometimes good for us, or good for Pratt and Whitney, or good for Curtis or for Allis, but it is not good for the country. They ought to find out what engine can be used best and then make a decision, and not make a decision, announce the thing, say, "We need an airplane, and anybody can participate in the competition, but the engine will be X." I think that is a political decision.

TFX I mentioned just now, for the Army. There is a very similar problem. The Army picked an engine, regardless of whether it is good or not good. The Army will say it's good, and it is good. I think it is a good engine. But there have been cases, which I know damn well, in which some of you may have participated, where the decision was made, "Just let's have this engine." Sometimes they go through the motion of competition, but it is not competition. I'm not saying decisions are against General Electric, because sometimes we win. We also benefit from it, but it isn't right. Let's have the right competition and then make the decision as to what is best for the country.

Political decisions I think are terrible. What do you see in the newspapers? A Congressman announced the award of a contract. On CARIBOU, now, which we bought for the Army, I think there is a General Electric engine. Do you think we can announce it? A Congressman has to announce it. I think this ought to be changed to a point where the military

announces the decision, or at least it looks like a military decision, not a political decision. Now, I am not authorized nor knowledgeable enough to really know why, but it just doesn't strike me as right.

Now let us come to an understanding of the advantages the Government receives from commercial sales. A lot of it comes in new hearings, last year's and this year's hearings. You develop a jet engine for the military. You get it all paid for. Now we are using those engines in commercial service to fly Boeing 707's and Convair 80's or 90's. Why doesn't the contractor pay all the money back again, and so on? We do. We share the use of tools. We share the development money. But the Government has a tremendous advantage when the contractor operates the same product in the commercial field. The people are either not as well trained or they fly a hell of a lot more hours. An airline pilot flies 200 hours a month, compared with 20 or 30 hours in the military. Therefore, the problems will be recognized very much earlier. We at our expense make corrective actions for the commercial airlines, and apply these to the military.

This is enough of this. I just want you to know that the military has a great advantage from anyone--Pratt and Whitney, General Electric, Curtis-Wright--in the aircraft business, or in the automotive area, maybe on engines used in automobiles. Whatever the similarities are, I don't know. But in the airplane business the Government has a great advantage from the contractor's applying a military-developed product commercially.

It doesn't cost the Government a penny. The knowledge learned and the hours accumulated are valuable, corrective action will be taken earlier, and it is to the overall benefit, not just a little but by a wide margin, to the Government when we do this. So I hope you take this message with you.

Gentlemen, this is my point, this is my message:

1. You show personal interest.

2. You measure, in any way you see fit--by auditors, rumors, and personal reports from the customers. Search it out. It may not be good.

3. Gentlemen, walk the shop. Go around. Your shop may be physically a shop or an installation in Formosa, an installation in Korea. It's fine to go over there anyhow. It's kind of wearing to fly at night and be there in the daytime. But go over there and smell it yourself. You boys know that. You have been around. I am sure you got input that you wouldn't have got if you hadn't gone around.

Thank you very much.

CAPTAIN O'TOOLE: Gentlemen, Mr. Neumann is ready.

QUESTION: Sir, you mentioned political decisions. Would you discuss the possibility of a supersonic transport for military use or for civilian use? And which should come first?

MR. NEUMANN: It so happens that I have a chart on it. But this was not a planted question. SST-Supersonic Transport. I won't go through the whole chart. I just made a presentation two afternoons ago before the whole

select group of the FAA who evaluate this transport for the airlines and the airplane companies. Right now McNamara has said that the military doesn't need a supersonic transport. Without the military doing this I don't think the transport will fly or that the program will go. You are the only totally qualified and staff organization to do this job.

As long as it is nonmilitary, the Government says there should be a sharing, a 25 percent sharing, of the contract. That is a totally impossible and unacceptable program. We have so stated, and I am sure it will not go. For this program, the development of the engine alone is a \$750 million development. On top of it the airplane will be another billion, so it will be close to \$2 billion before you have a developed and commercially sound and safe airplane.

No nonmilitary, no nongovernment, institution can do this. If we share \$250 million on an uncertain thing which can be cancelled or can be discontinued, no manager in my position would do this to shareholders.

In this particular case I see no way out personally. Don't quote me, now, because I will be in trouble with the FAA, and they have a right to select the benefits. I see no way out of the Government's not getting into the supersonic transport.

STUDENT: How about some corporationlike concept?

MR. NEUMANN: A joint corporation, with some people put together?

STUDENT: No, I mean in private industry.

MR. NEUMANN: I would say that is a possibility. Some people would not agree with that at all. I know that we would not want to work together with one of our competitors on this one program, and give all the technical

know-how and things that we have and they have. But I think there is a need for the United States Government to have this. Can you imagine President Johnson going to Moscow for a talk and flying in a Boeing 707 and Khrushchev coming over here in a Russian supersonic? They are building one right now, and the French and British are building one. There is no way out of the United States not building a supersonic transport.

QUESTION: Mr. Neumann, how does what you have just said compare with Boeing's going it alone on the 707?

MR. NEUMANN: The money they spent on the 707?

STUDENT: Yes.

MR. NEUMANN: Well, the 707 came from a tanker, KC-135 I think it was. Did someone shake his head on that?

COMMENT: It was Project X, a military program. They spent about \$50 million of their own money to start with.

MR. NEUMANN: The whole development of the KC 135 must have been a quarter of a billion dollars, \$250 million. I am talking about not just development through certification. We find that usually the development and redesigning expense after certification matches the initial cost. When General Electric gets an engine qualified for production and put into service, then there comes the service-revealed difficulties, not those which you find in the first few flights but those which determine the life of these things.

So the amounts spent after qualification through the life of the product are at least as high as those which are spent through the initial

development.

I don't know if I am responding to your question right. The 707 development was cheaper than the DC-8, and certainly cheaper than the Convair 80. I can talk about this, because my engine is on the Convair 80 or 90. Convair lost, according to the newspapers and Fortune Magazine, between \$350 and \$400 million. General Electric lost \$89 million at that time. Why? The engine is excellent. But there were so few airplanes flown when we developed the engine that we are \$90 million in the hole. We couldn't do this again.

QUESTION: Do you also object to the Government's recovering the development cost on the commercial sales of your engine?

MR. NEUMANN: Yes. I think it is impossible to compete with a fully government-supported, government-financed operation in England and France, where the airline operator has only to pay fuel, maintenance, and pilot salaries, and have an American plane be so efficient that it not only competes there but recovers \$800 million or a billion. I think it is not only impractical but I think it is impossible to be competitive.

You can't compete with a fully private thing, government-industry sharing here, compared to a fully subsidized operation. I am sorry, but I think that's the way it is.

QUESTION: The Air Force has been most interested in a follow-on bomber. There have been studies on this. Have you been involved in these studies? If so, are you able to meet the requirements that the Air Force wants for this follow-on bomber from a propulsion standpoint?

MR. NEUMANN: Yes, we have been involved in the development of the engine for the advanced bomber. We, of course, have developed the J-93 for the B-70, which is a Mach 3 cruise engine. The engine is qualified and certified to be installed in the B-70. We hope to fly one one of these days.

The requirement for the new, advanced bomber can be met. We have the engine. The engine can be modified or we can design a new engine. The answer is yes. The requirements can be met, provided that the requirements are practical and reasonable. It can be done, yes, sir.

QUESTION: My question deals with United States airlines' purchases abroad. What impact with this have on particular manufacturing concerns of aircraft in the United States.

MR. NEUMAN: Which aircraft do you mean--the SST or the British BAC 111?

STUDENT: Both. They are buying the BAC 111 and have options on buying the supersonic transport. My question is: What impact will this have on the United States aircraft industry?

MR. NEUMANN: I think it will be disastrous. Already Douglas is making a DC-9 in competition with the BAC 111, which does a similar job. This puts Douglas in a very bad position. They have sold very few of those transports so far. They will sell some more. Then we'll wind up with another Convair 80 or 90 situation or a DC-8. As a consequence, they'll go broke. If they don't make out a hell of a lot better on the DC-9, as a consequence of the BAC 111 being bought by American companies, Douglas will have had it.

Douglas does not participate in the supersonic transport race, although they are really the leading manufacturer.

If the United States has to buy a foreign supersonic transport, I just think it will be disastrous here, because there will be very few new transports built. The 707 is very good and the DC-8. This subsonic range will keep them flying for 20 years. There will be a smaller thing. FAA will say it. They propose now a small, feeder transport. This requires nothing new. It may be a turbo prop or maybe a little fan engine--nothing new.

The only really new thing is a big, supersonic transport. No. 1, it will come. It is impossible for it not to come. It may come in 1972. It will come in 1975. There will be a supersonic transport. There will be several hundred of them. If those have to be British and French or Russian, and not American, I think the effect will be disastrous on the companies--not the engine manufacturers, much, but on the aircraft companies.

QUESTION: Mr. Neumann, will you tell us about the executive-development programs which you operate, not just the individual programs but all?

MR. NEUMANN: For management development? I wonder if you are referring to our Management Institute at Crotonville, New York.

STUDENT: I am talking about your specific actions with relation to developing the people below you.

MR. NEUMANN: I have to admit that I don't really have a plan. We have a general plan in my division to get recognized the young people

who are really good. This we do. I ask my employee relations managers to pick out really young, brighteyed, bushy-tailed guys who seem to be aggressive and good. We cannot replace those reporting to us who are good and adequate before we have better men as a runoff.

What we do now is try to take the bright people. On the supersonic transport I took a young man who happened to be a former Air Force officer, 33 years old, extremely bright and capable, but still somewhat inexperienced, obviously. We assigned him directly to a general manager at the head of the supersonic transport program.

I have another young man like this directly responsible for VSTAL. Those are 33 to 35 year old people whom we assigned to experienced men and hope that they get well educated, indoctrinated, and then run on their own.

I feel that I don't answer you right. I have no formal plan but we just pick the young people and put them out and then watch them.

STUDENT: Do you think that is all that is necessary?

MR. NEUMANN: Probably not, but it is the only thing I am doing.

QUESTION: Will you back up a little bit on your own personal daily activities? You referred to daily written reports from your subordinates and weekly reports from you up. Who provides these reports? Is it the project managers only, or is it across the board? Are you in the shop walking around six days a week? Do you travel much? Do you have an assistant who takes command when you are not there?

MR. NEUMANN: My favorite subject; No. 1. Everyone reporting to me has to write a daily report. If nothing happens, he has to write a

daily and say that nothing happened. That will never happen, because, I'll say, "What the hell are you here for?" The limit is a one-page report. They can't write more than one page, unless something really urgent comes up, and they get a red light.

I get a report daily not just from project managers but from each man. The beauty of it is that I have a project manager write me and the department manager write me, and there are often conflicting stories on the same subject. Then you are the only one who can really resolve it.

I am now a division manager and I have several departments on the chart which you saw here. This applies to a level lower than mine, to a department general manager. The department general manager has these projects and manufacturing and so and so. I have several departments. To me write now personally just the department managers daily on what happened in their places. I combine this report up once weekly.

The problem is, if they do all the things I say they will have to be supermen. You just can't do it. But you have to do it as often as you can. I travel as little as I can. I am here only to talk to you. I was here for the FAA session in Washington, anyhow, so yesterday I took a day to visit the Admirals and the Generals and other sources to find out customer feelings and what they think about. I saw them all right down the line, key people. Now I talk to you and then I head for home.

The third part was: Do I have an assistant? We are not permitted in General Electric to have assistants. I have assistants with a small

"a." These are illegal, so to speak. I call them consultant-division-efficiency. This you can do anyway. No one can object to that. So I have such a man. I don't really give him the authority to make decisions. I give him the authority to execute decisions, but he presents the problem to me and I make the decision.

That's an important thing. General Electric is a company which prohibits assistants to managers. You are responsible. You make the decisions. I tried it the other way and got by with it. Later I got caught. Now I do it exactly the way I just said. I have two very good men, experienced men. I tell them to take a reading on manpower use. They come back and tell me what it is, and I say, "You know what we ought to do. We ought to cut this down and increase this and do this." I write a letter to my staff and say, "I ask Mr. So and So to carry this through." So he is carrying through my instructions. But he is an assistant with a small "a." In other words, he is not making decisions when I am away. I make them right here from Washington. They call me every morning and tell me what is going on.

QUESTION: Mr. Neumann, would you tell us more about the VSTOL Program, and how far and how fast it is going to come along?

MR. NEUMANN: How fast? How long? Thank you. That's a good subject. Here we are supposed to propose and we are developing in competition with US, British, German, and French--and I am sure the Russians are doing the same thing. The damn thing is we don't know is how long it should hover, and how vulnerable or invulnerable it should be, and how fast it should

be, and what load it should have. This has basic differences.

When I talk about how fast I talk about supersonic or subsonic. How long to hover? Four minutes, three minutes, or two minutes? Should it be single or multi engine? Some people say single engine, with fewer maintenance problems and fewer spare parts, and better logistics. This is true. But, if one engine conks out, like the Britsol B 1127, which went down in the Paris Air Show, a single engine doesn't seem to be the answer. Unfortunately, last week the French Balzac crashed and killed the pilot. That was a multi-engine Rolls Royce, with eight Rolls Royce engines in there. No one knows what happened there, at least we don't know.

How fast? How big? There are three systems. The British use a deflection system, a jet engine, where the exhaust can be diverted into a gas stream. The French, which just crashed, had direct lift. Several little engines blasted down. They were shut off when the thing flew down low to the earth.

General Electric has these two (on the chart). Proposing and working with the U. S. Army, this one is going to fly next month. This we believe has clear superiority on subsonic aircraft. It's a lift fan. In each wing is a big hole. In the hole is flushed a big fan driven by exhaust gas, one on the right, and one on the left--big fans, pumping a lot of air at low velocity. And there is one little fan in the nose to keep the balance. This system is the XV 5 A. It's Ryan-General Electric. General Electric is prime, and there's Ryan Aircraft in California. Republic on Long Island is now tied in with it. This is a system which ought to give the soundest,

most stable platform, and clearly the largest load-carrying capacity, along with range.

But the real problem is: How long should it hover? A little jet engine which is lighter and simpler, independent of connections with something else, uses a lot of fuel. If you read in your propaganda, that this company had a little jet of 50 to 1 with 25 times more thrust down than it weighs, that sounds tremendous. Don't get tricked into this. Wizards took over the question: How much fuel does it use?

Let me go through this very slowly for those who are not familiar with it. If a plane weighs 10,000 pounds and it has a thrust down of 10,001 pounds, obviously the thing is going to go up forever and ever, until it goes into orbit, unless the thrust gets less. The thrust gets less as the air gets thinner, with jet engines. So you want more thrust than the weight of the airplane. This is quite clear.

Now, there are various ways of doing it, but once you fly horizontally you need only about one-third of the thrust to push an airplane forward at a subsonic speed of 400 or 500 miles an hour. There are many ways of doing it. One is the lift-fan, which has a lot of thrust. When the airplane is in the air and flies and you shut off these fans, a valve takes the gas, instead of into these fans, back in the rear as in a normal jet engine, and it flies forward.

That's the Army system, which I think is a very good system. Direct lift? You can have a light engine and you can have a good chance of fuel consumption. A good jet, a little jet, which is very light, with a lot of

thrust, usually uses a lot of fuel. If you just sit there and hover three minutes, you use up more weight in fuel than a better jet engine, which has better fuel consumption, would use.

So, when you read 25 to 1, or 20 to 1, don't worry about it. We in the United States are as good as the British or the Germans any time. I think we can do it better. But we have decided to make better fuel-consumption engines, so that, when you hover, you can hover longer, although the engine turns out to be a little heavier.

But, as I say, we don't know how long. The Air Force says 50 seconds, or something, the Army says maybe 2 minutes. Well, you are going to hover to take off, and you want to hover to come in. You want to drop in an area between trees, but there is a whole load on the way, or something like that, so you may have to hang on for a while. Or you can fly around and then come back again.

This hovering time is the important thing, and the vulnerability time, the single or the multi engine, and the whole matter of finding which military services wants to operate it. They all have different ideas.

If I sound confused, then I give you the proper impression. It is confusing as hell. We are aware of this. Our Government doesn't know it, the countries don't know it. The military services have got to do it.

So VSTOL is still a long way off. In the meantime, with helicopters, which are VTOL, they are doing a fine job.

QUESTION: What place do auditors have in your organization? So

they report to the department head? Or do they report to you?

MR. NEUMANN: I draft the auditors from the regular organization. They are in the organization . They are always very good. I tell the general manager I want Joe to come up and work for me for 2 or 3 weeks.

STUDENT: He doesn't have any problem going back to the other department?

MR. NEUMANN: Not once it is known, as I say, in the beginning down there. As I say, you may as well tell your people that's the way you operate. What I actually do sometimes is take an auditor from Department A to audit Department B. When he comes back he has learned a lot about what is going on over there. So you can mix them up a bit. But I don't mind his auditing his own or any place.

QUESTION: Mr. Neumann, do you have any problem in applying your two principles of quick communication and walking the shop?

MR. NEUMANN: Yes, we have some problems, and we've had some problems. I did walk the shops in Japan and Germany, where the J-79 is licensed, and I found serious problems. And right now we have a problem in Holland, where the engine is also being put in the Dutch Royal Air Force. It depends on your contract. In this case we are are doing well. We have no contractual ties with these foreign governments or companies where the engines are licensed. They fought the license completely. As a matter of fact, they requested that we leave them alone.

Some license agreements between the United States Government and their government, or between the United States company and their company,

say that we are responsible, as the daddy of the license, to nurse this engine through to production and into service. The licenses we have on the 79 are completely cut off, and any other work we do is on a separate contract.

I wanted to keep people stationed there and they requested on paper to us that we move the General Electric people from overseas, that they would like to do it by themselves. We still visit them socially, so to say, to find out what happens, because it hurts our reputation if their 104 over there cracks up.

But contractually we are separated from them. Once the engine enters into production we are through.

QUESTION: Mr. Neumann, you were speaking about technological development on management, and I would like to ask about technological development in management primarily. The scientific method school of management has become popular over here. Is this a big problem in your organization? Do you have many of the OR types, the operations research systems theory people? How about APB? Does this give you a lot of disciplines which you have to cope with? And do you have a hard time managing them?

MR. NEUMANN: I disappoint you, because I don't have such things. I may miss the boat here. I have one department which is the Advanced Engine and Technology Department for the supersonic transport engine, the VSTOL. Right now in that department are these long-hair boys, who are still somewhat production minus, and who develop the thing to demonstrate a principle. Once the principle is demonstrated it is transferred

either to a large engine production department or to a small engine production department.

I know I am again not responding to you. I am sorry. I just have really nothing to do with a lot of new, novel types of systems. I may be too oldfashioned. I go the old way down there. They develop these things here. We don't go to school.

You are talking about a schooling system?

STUDENT: A school of management.

MR. NEUMANN: I get all kinds of letters asking, "Won't you please attend this symposium?" There's a lot of drinking going on, so we just keep our people at home and at work.

QUESTION: Sir, with respect to the DOD Cost Reduction Program, will you give us your comments on what GE is doing--your personal view?

MR. NEUMANN: Right. The Cost Reduction Program is a very important subject. It is popular and it is very important. In General Electric in my Flight Propulsion Division, I get to talk to the other divisions on Defense, and we take it as being most serious, and we are making very good progress. I can't tell you how good the others are doing in the country and in the other divisions, but General Electric's Flight Propulsion Division has done a tremendous job in cutting the cost of engines--really dramatically. I mentioned this before.

However, I am concerned about one thing, and you all know this. To buy the cheapest is suicide for the Government. I believe McNamara made it very clear that he doesn't mean the cheapest, he means the cheapest but best, or the cheapest and something. There's a big difference.

I can tell from experience on a thing which I just lost with the Air Force and Navy in competition. It is a constant-speed drive. This is a gadget attached to a jet engine which keeps the electrical power system operating at the same RPM, independent of the engine speed going up or down. It's a very important program. General Electric makes them and Sundstrand in California. We have made about several thousands of these drives for the F-4 program, and we suddenly lost on an annual rebid the contract to someone else, Sundstrand of California. They soundly beat us in price, with the same specifications. We deserved to lose, because we had some inefficiencies and poor operation. There is nothing we can do about it, and these are not sour grapes at all. I am glad for them that they won it. However, our gadget is running, flying, and proven in stock warehouses. Now, for a mere \$1200 per unit, which is vital to the aircraft, they are changing vendors to get a brand, new supply.

I think that is the most foolish thing that ever happened. I don't blame them for taking it away from us through a sealed bid, because one was lower than the other, but I think it will cost the Government a hell of a lot more, because I know now that their drive is running on our engines. I know already the problem. It will take a long time to fix it. So the mere bidding, and the opening up of an envelope in a sealed bid, found a unit price of \$6230 from General Electric and \$4,900 from someone else. So they switched over to all new learning, all new development, all new supply. In this one case--and I don't think it is an exception--

I think a cheaper buy for cost reduction is the wrong thing to do.

QUESTION: Mr. Neumann, I read last night in the Washington Star that BOAC has put in a order for five U. S. SST's, bringing, I think, the total of those orders to somewhere around 50. Am I right in my figure?

MR. NEUMANN: Right.

STUDENT: BOAC said that they were doing this as a form of insurance. Can you give us your opinion on this? Do you think we are going to beat them or tie with them with the U. S. SST?

MR. NEUMANN: We'll be later. That's a sure thing. They have slipped already one year on their schedule. They said they would fly in 1969 in service, and now it's 1970. Our program now runs that ours will be in service in 1972 or 1973. So clearly we will be late. I don't see any problem about being later if we have a better airplane. The Comet came first and we came and beat it. I think being first often is very dangerous. You have to take all the beating and the awful experience and someone else sits in the corner and watches you, makes corrective actions, and wins. Being first I think doesn't mean a damn thing. Provided that we fly earlier than the British fly, then, by God, the people know that we do have a transport, and they will gladly wait to see it.

Unfortunately, these deposits are nothing but propaganda. Mr. Hallaby will say so publicly and has said so. The down payments on the orders mean nothing whatsoever. They are just a few hundred thousand dollars that they will get back again if we don't go. So it's just a

propaganda thing. Insuring delivery doesn't mean a thing. As a matter of fact, it means nothing. Would FAA agree with me. Can you tell me?

COMMENT: Yes.

MR. NEUMANN: O.K. It is good to know that they are interested. They can't afford not to be. They don't know if the other one will fail, so it doesn't cost them anything. You might as well put your bet on everything, and then later you will buy what comes.

QUESTION: Will you please expand on some of the rationale that GE uses to determine whether they will centralize or decentralize types of management?

MR. NEUMANN: I don't know what went on in the mind of the Chairman of the Board when he decided to decentralize. I know that he said, "I was one of the lonliest men in the world when I decentralized, because all the staff assistants, and so and so, were all fully for centralization in company headquarters." He fought it through to give the various businesses their own general managers and made them responsible for profit and loss. I think that whatever went on in his mind was right. I said before that we went from \$2.2 billion to \$5 billion, and we got younger people, on the spot, who know what their business is, and who are given the right to do things within a certain limit. Obviously, we can't squander company funds. Before you spend millions of dollars, you have to go to top headquarters and apply for it.

I think it's quite simple. I think it has happened in the military. Mr. Gilpatric, I believe I read in last night's Washington Star, made a

similar statement. After these years in the Secretary of Defense Office up there, he thinks the Army, the Navy, and the Air Force should have their own damn programs, and that they should be just tied somewhat together. This is decentralization to a business level, the same as I said before we are doing.

I don't know what went on in the Chairman's mind, but I think it was the right way to do it.

CAPTAIN O'TOOLE: Mr. Neumann, all of us thank you for sharing your knowledge and managerial experience with us.

MR. NEUMANN: Thank you very much.

